Neural circuitry of time orientation: a lesion study

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Benton Temporal Orientation Scale

What month is it? (-5 per month, max error -30)

What day of the month is it?

(-1 per day, max error -15)

What year is it? (-10 per year, max error -60)

What day of the week is it? (-1 per day, max error -3)

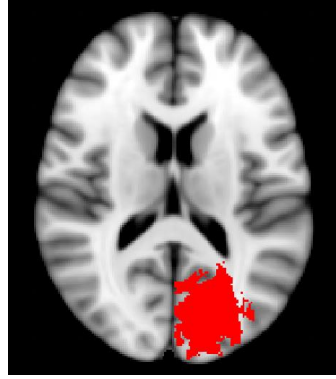
What time of day is it? (-1 per half hour, max error -5)

Characteristic		All Patients (N=450)	Impaired (n=20)	Unimpaired (n=430)
Age in years	mean (std)	52.66 (14.35)	61.99 (15.46)	52.22 (14.17)
Education in years	mean (std)	13.34 (2.85)	12.35 (4.57)	13.39 (2.74)
Gender	female	209	10	199
	male	241	10	231
Handedness	right	395	15	380
	left	41	4	37
	mixed	14	1	13
Race	African American	7	0	7
	American Indian	1	0	1
	Caucasian	441	20	421
	unknown	1	0	1
Ethnicity	Hispanic	2	0	2
	non-Hispanic	447	20	427
	unknown	1	0	1
Lesion volume in cubic mm	mean (std)	49347 (56366)	69767 (49622)	48388 (56533)
Lesion laterality	right	161	7	154
	left	198	3	195
	bilateral	91	10	81
Etiology	ischemic stroke	231	6	225
	hemorrhagic stroke	73	3	70
	subarachnoid hemorrhage (clip, coil)	20, 2	0, 2	20, 4
	tumor resection	65	2	63
	other resection	22	0	22
	head trauma	14	2	12
	encephalitis	12	5	7
	multiple etiologies	9	0	9

Neuropsychological Test		p-value
Rey Auditory-Verbal Learning Test*	Trial 1	0.00176
	Trial 2	7.24×10^{-5}
	Trial 3	7.87×10^{-5}
	Trial 4	7.05×10^{-6}
	Trial 5	2.01×10^{-6}
	30-minute delayed recall	3.85×10^{-8}
	recognition	1.42×10^{-7}
Rey-Osterrieth Complex Figure*	copy	0.00116
	recall	1.16×10^{-7}
	time to complete	2.13×10^{-6}
Benton Visual Retention Test (number of errors)*		3.27×10^{-5}
Boston Naming Test*		8.34×10^{-4}
Controlled Oral Word Association Test		0.110
Judgment of Line Orientation		0.491
Facial Recognition Test		0.0150
WAIS subtest - Arithmetic		0.0657
WAIS subtest – Block Design		0.0661
WAIS subtest – Digit Span		0.274
WAIS subtest - Similarities		0.898

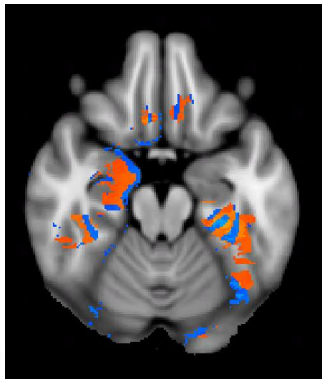
*significant after Bonferroni correction

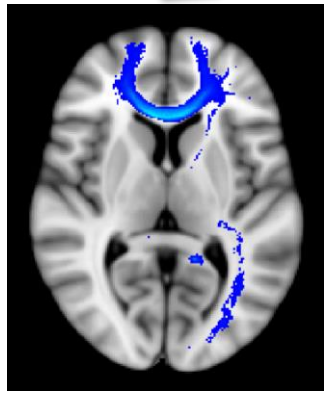
Trace lesion in native space



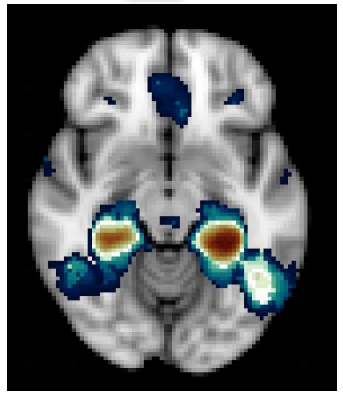
Transform into MNI152 space

Proportional subtraction

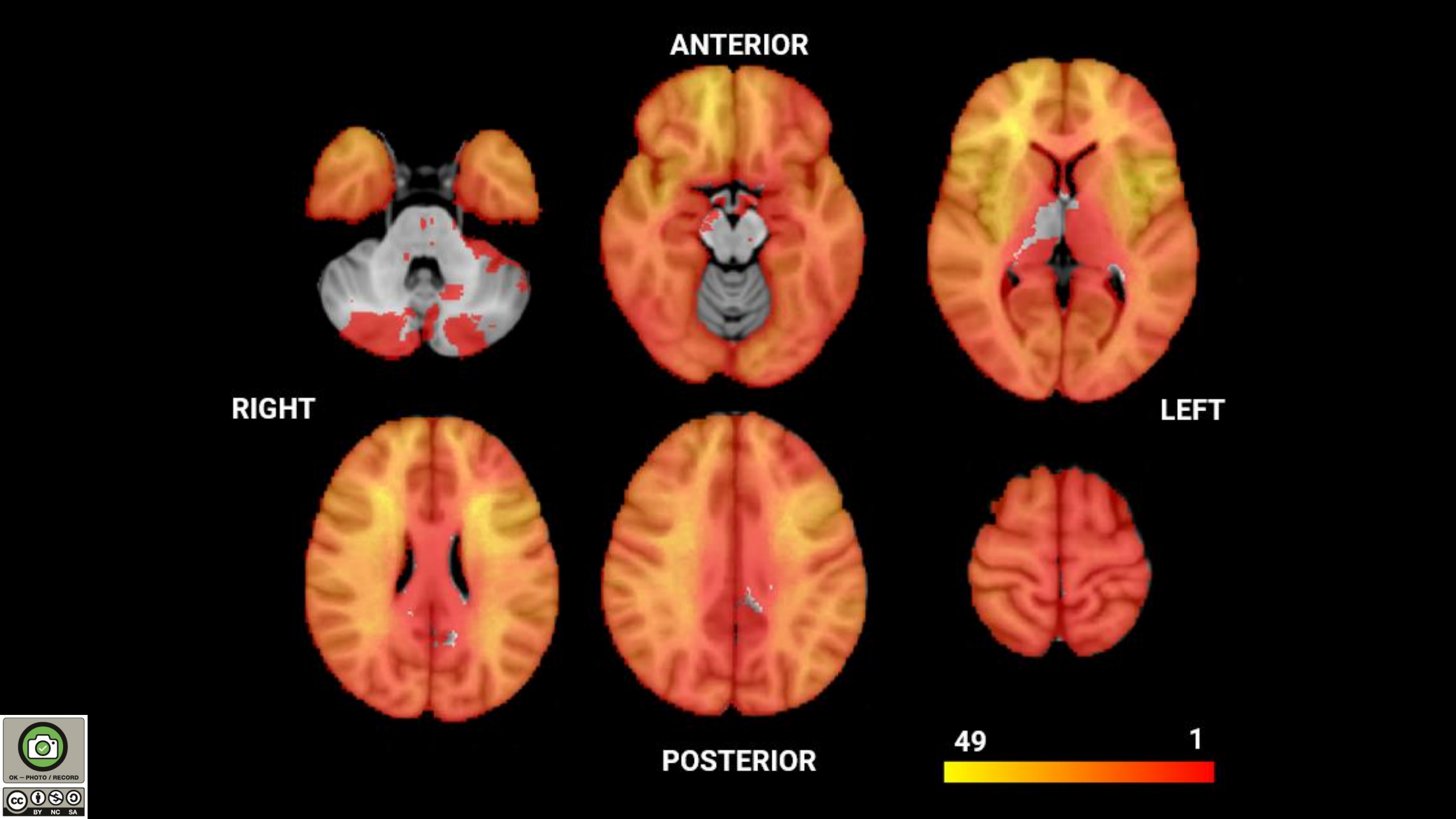


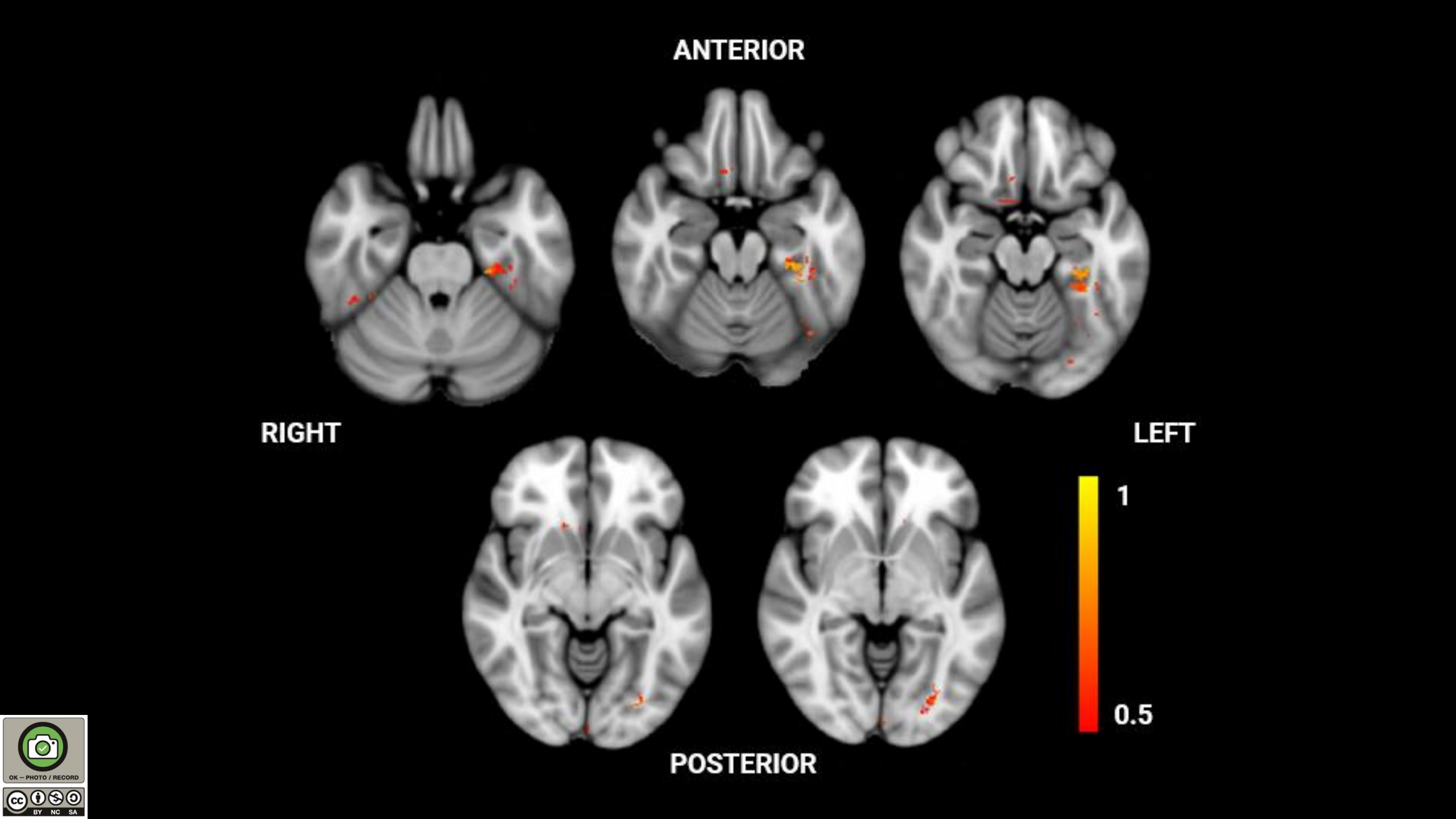


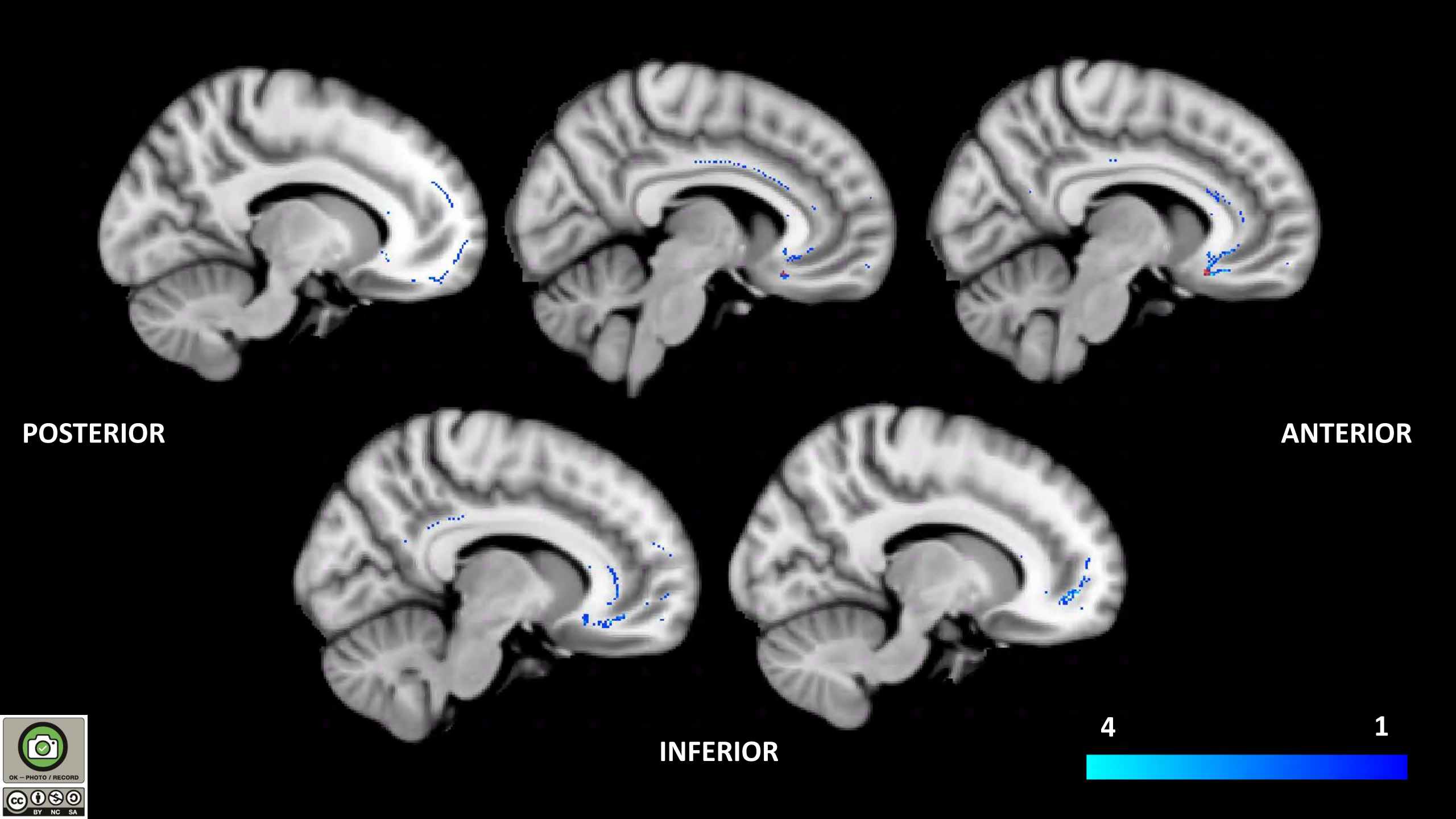
Fiber tractography

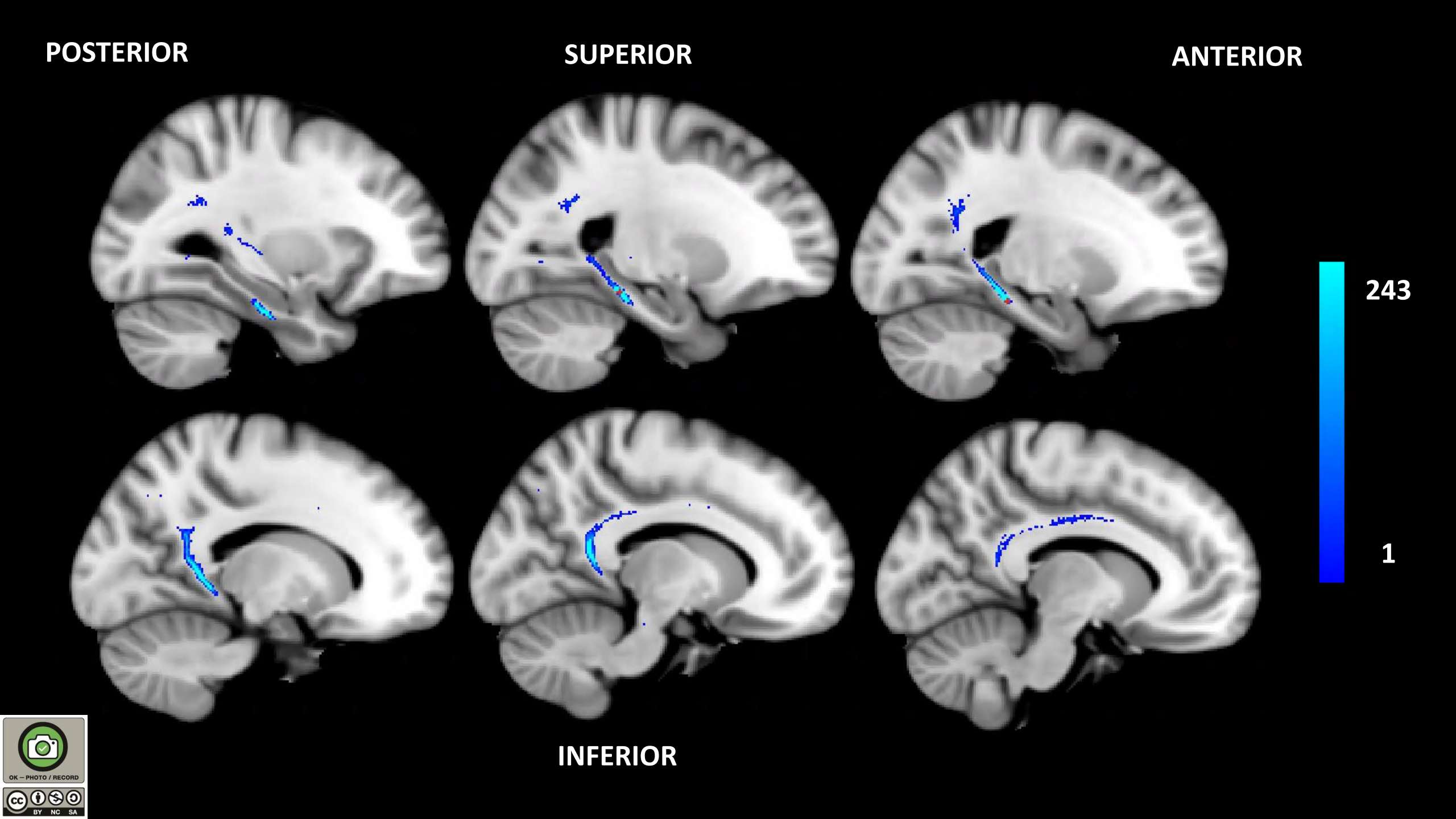


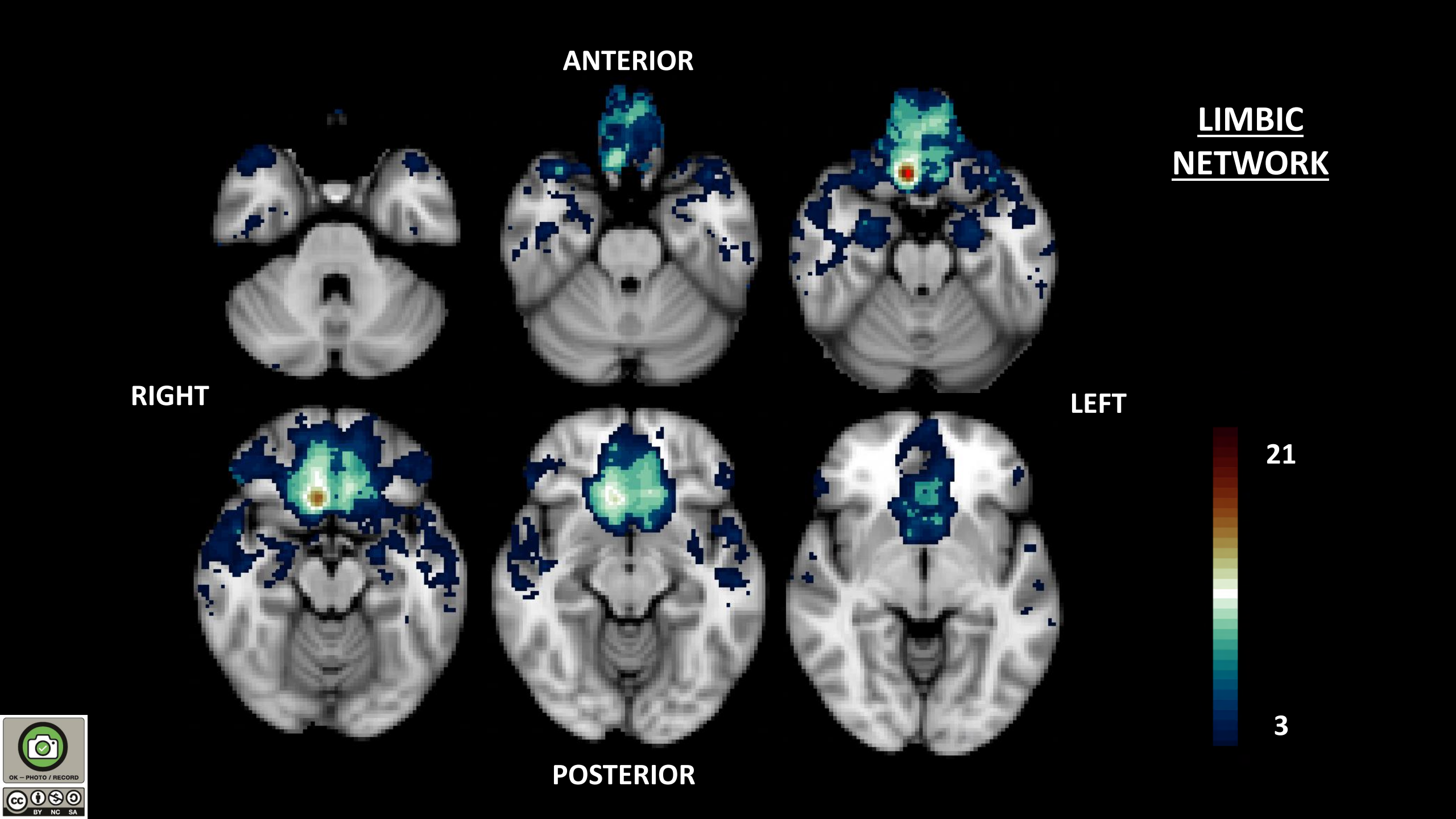
Functional lesion network mapping

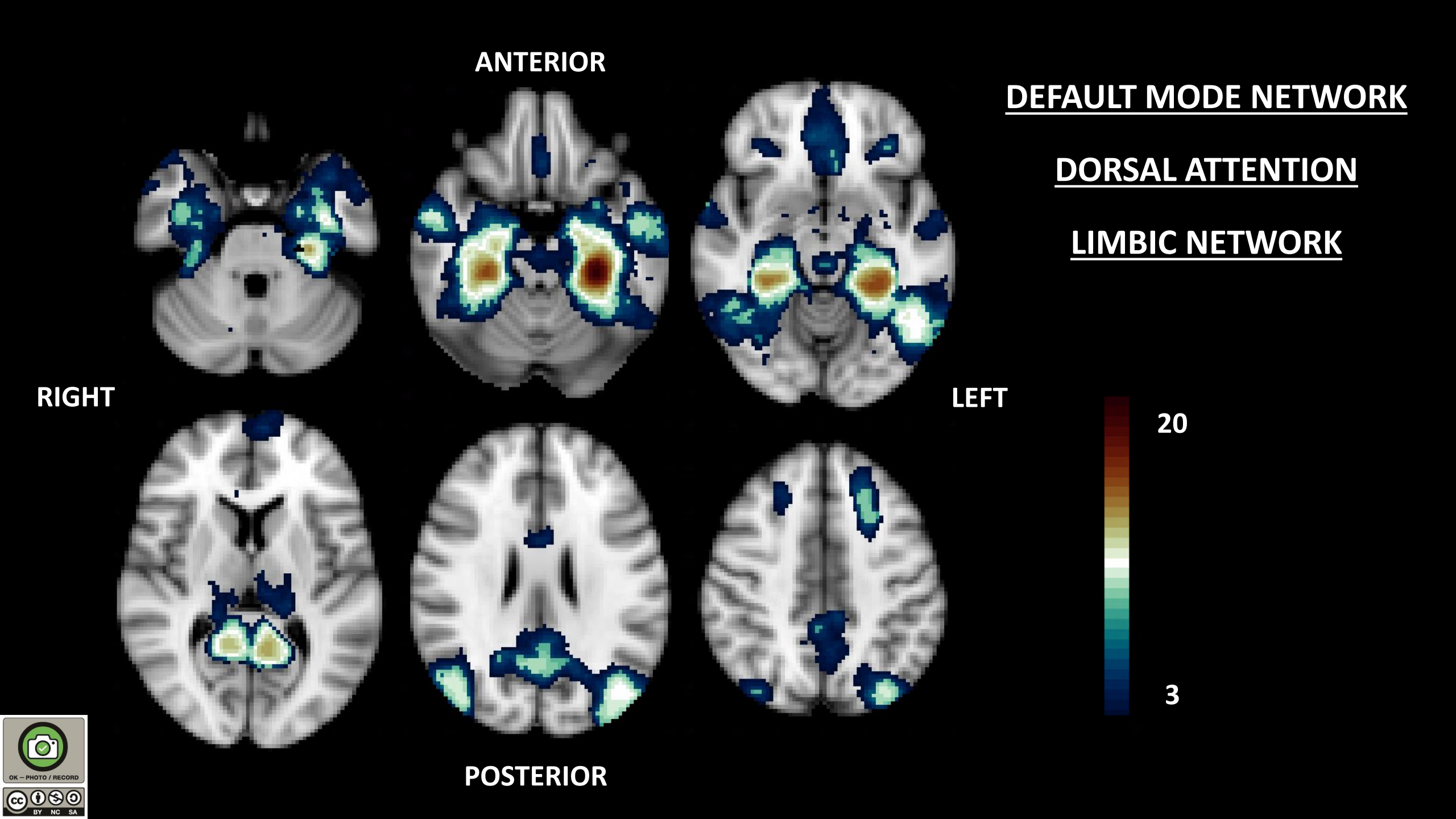

ANTERIOR
RIGHT
LEFT
POSTERIOR
49
1






POSTERIOR
SUPERIOR
ANTERIOR
243
1
INFERIOR




ANTERIOR
DEFAULT MODE NETWORK
DORSAL ATTENTION
LIMBIC NETWORK
RIGHT
LEFT
20
3
POSTERIOR

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OUR AWESOME REGISTRY PATIENTS!!